U.S. Coast Survey Labors, 1861-65

The U.S. Coast Survey, subsequently the U.S. Coast & Geodetic Survey, in 1854 charted the Umpqua bar and lower estuary and published its "Preliminary Survey of the Entrance to Umpquah River Oregon." Lt. James Madison Alden mounted the hydrography and George Davidson laid out the geographical features. The emergence of Scottsburg in 1852 as a shipping point to the interior and, most particularly, to the mines of the Rogue River Valley and the upper Klamath region drove this harbor reconnaissance (Davidson and Alden 1854).

Years passed. Not until 1861 did the U.S. Coast Survey mount the reconnaissance of the Coos Bay bar and estuary. Between the wreck of the *Captain Lincoln* in 1852 and the advent of surveys to try to fix the channels at the harbor entrance, several vessels foundered. The trials at Coos Bay were many: shifting channels, lack of steam tugs for pilot service, failing winds at crucial moments when sailing ships were in perilous waters, incomplete information about the entrance, and lack of lights and markers to assist mariners in lining up their vessel with the channel. James Lawson's assignment was to document the bar, channel, and estuary (Bache 1861).

On April 15, 1861, Alexander Dallas Bache, Superintendent of the Coast Survey, defined the scope of Lawson's work. "Before leaving Washington Territory," Bache wrote, "please make arrangements to measure a preliminary base and make a triangulation to include Coos Bay, Oregon." He told Lawson to carry out a plane table survey so that his crew could proceed with a full hydrographic study of the bay. "When the preliminary survey is complete," concluded Bache, "please report in the usual way with sketches and statistics" (Bache 1861). Lawson confirmed receipt of the orders on May 20 and wrote: "I am now making preparations for sea, and at as early a date as possible, I will execute the work assigned me" (Lawson 1861a).

Lawson sailed to Coos Bay on U.S. Coast Survey brigantine *R. H. Fauntleroy*. On June 16 he wrote: "We came in beautifully, without a pilot, and

will commence active operations tomorrow" (Lawson 1861b). In spite of the initial optimism, Lawson's work proceeded slowly. On September 10 he noted: "The weather here is truly terrible, for the last three weeks, at least two-thirds of the time has been foggy; for the last four days I have seen the shore only at rare intervals, and still it continues" (Lawson 1861c). By mid-November, conditions had not significantly improved. Lawson departed for San Francisco where, on November 18, he described his problems on the project at Coos Bay:

> The weather at Coose Bay remained very much of the same character as I had reported to you, presenting but few favorable opportunities for work. Of these I tried to make the best use. In the Hydrographic work I was only partially successful. The inside work I have done satisfactorily, but the outside does not suit me. It was impossible to attempt that work [outside the bar] in a small boat, so I made use of the steam-tug during one day, and endeavored to do so on other occasions, but failed on account of the heavy sea, the pilot refusing to go out. When the Brig was towed to sea the bar was beginning to be heavy, in consequence of a South Wester blowing at the time. There were other vessels in the Bay ready for sea, not one of which has yet arrived [in San Francisco]" (Lawson 1861d)!

Lawson continued to feel downhearted about his poor luck with weather and inability to mount the critical bar survey. On March 20, 1862, he reviewed his efforts at Coos Bay:

> I cannot furnish my hyd° [hydrological] work in as satisfactory a style as I desire. This is the first time I ever attempted such work, and that little experience has taught me many things, whereby it could have been much improved. The work outside [the bar] was done in the steam-tug 'Fearless.' I did not dare attempt working on the Bar in an open boat at this season of the year. The weather was much against me in executing this part of the work; I only succeeded in getting outside once in the tug, but of that I made as good use as possible. I remained out longer than the pilot desired, and in consequence, it was just the stage of extreme L[ow] Water, spring tides, when we crossed the bar to return. We then found 11 ft. on the Bar. The tug was drawing 9 1/2 ft.! There were 3 or 4 breakers continually rolling over the Bar, and we thumped the whole way over. After that I made repeated attempts to go out again, but the seas were so heavy that the pilots refused to incur the risk" (Lawson 1862a).

Realizing he had not completed his assignment, Lawson on January 21, 1862, sought instructions on what to do next. His sentiments leaned toward returning to Coos Bay: "It is a great want of economy," he wrote, "to commence a detached piece of work, and not continue to its completion, after a few seasons the points of any previous work are lost, and thus much of the same has to be gone over, in order to form a connection." Lawson hoped to return to Coos Bay, pick up his labors, and drive the survey up the estuary to the sawmill and coal mines, as he noted, "where the greater part of the shipping interests lie." To accomplish this goal, he requested a double party (Lawson 1862b).

Superintendent Bache concurred with Lawson's suggestions to carry to completion the survey and hydrography of Coos Bay, but first ordered him to resume labor at Grays Harbor, Washington Territory, because of pressure from the territorial delegate (Bache 1862). Lawson departed from San Francisco on the *R. H. Fauntleroy* and was three times forced back to the harbor by weather conditions. He finally arrived off Coos Bay on April 26, 1862. The vessel had to wait at sea for two days and nights because of a storm. "On the third day we came in without a steam tug," wrote Lawson, "at high water of springtides, finding only 15 ft. Last summer there were 19 feet." He continued:

> This bar has changed very greatly during the past winter. Instead of a narrow channel as my sketch shows, the whole entrance was channel--scarcely any N. or S. Spit, and of course the depth was much lessened. At one time 13 ft. was the deepest to be found at highest tides. It is now deepening a little. A few days before I arrived, a vessel, that had been here over two months, got out, and the day I arrived, another one, that had been loaded over a month, both of them having to take off their deck loads before risking the bar, and then one of them thumped heavily" (Lawson 1862c).

On his 1861 and 1862 Coos Bay charts, Lawson penned critical "Sailing Directions."

> In entering the Bay bring a green clump of trees surrounded by a large extent of dead ones on the Eastern side of South Slough, and the bluff forming the S. side of the Entrance to the Bay in range

(bearing S.E. by E. by Compass). When on this range the position of the Bar is designated by the House on Gregory Prairie [the meadow at Lighthouse Way north of the later Cape Arago Lighthouse Reserve] showing between the two inner rocks off Yokam Pt.

The course for entering the Bay keeps you in mid channel until nearly ahead of Guano Rock. The channel is then distinctly marked by the breakers on either side, until up with the last point of bluff on the South point of Entrance, and as soon as the house (Charleston) opens, haul suddenly to the Northward, keeping close to the Western shore to where the Bay widens out, then head for Saw Mill Wharf at Empire City.

If after entering tide and wind are unfavorable for proceeding up the Bay, good anchorage may be found off "Charleston" in 6 f[atho]ms (Lawson 1861e, 1862d).

Lawson and his crew in 1861 established triangulation stations--base points--for their initial surveys of the estuary. The fixed "Station N[orth] Base" on July 9, 1861, on the upper part of the North Spit. Lawson wrote: "This station is on the flat on the W[est] side of the Bay, opposite Empire City and about 1/2 a mile S. of [John] Henderson's house. The mouth of a slough running into this flat and gradually lost in boggy ground at the foot of the sand hills on the Peninsular, is 77 metres S[outh] of the station; other than this there are no natural marks to which to refer the station, which is 20 paces from H[igh] W[ater] mark in a line to the bluff above Empire City." On July 27 the men marked "Station N Base" by setting a spruce log, three-feet-long and twenty-six inches in diameter, into the ground and driving a copper bolt into its upper surface. They erected a white pole 13.6 feet long from which to make their sightings (Lawson 1861f:5).

Also on July 9, 1861, Lawson's crew established "Station S[outh] Base." The site was on the shore upstream from Empire City. Lawson wrote: "This station is on the W[est] side of the Bay, inside the lower enclosure on the claim of John S. Henderson. At this place the sand ridge approaches the shore line, bearing a triangular space of flat ground. About 6 f[ee]t from the base of the sand ridge, and 60 metres from the lowest fence, is placed ▵ S. Base. There are two small

clumps of bushes, one on either side of the Station, the Southern a few feet farther distant than the Northern." The men erected a black and white pole, fourteen feet high, to use in the surveys and set a spruce block in the ground with a copper bolt nailed to its top (Lawson 1861f:7)

Starting near trail which cut from the ocean beach across the North Spit to the landing near John Henderson's house, the survey crews established between June and September specific stations the length of the spit. Lawson described each in his field notes:

Station "N[orth] Sands," Coose Bay, Oregon

> June 24th This station is near the extreme S[outh] p[oin]t of the Peninsular on the N[orth] side of the Entrance. From the termination of the ridge near △ Skiff the whole surface of the p[oin]t is level, only broken at intervals by a collection of sand around some old drift log. On one of these, two or three feet above the common level, the signal is placed; there are no natural objects, not a blade of grass, to which the station can be referred; its position can best be found by reference to the accompanying sketch.
>
> Station is marked on surface by three stubs, with copper nails, each 6 ft. from center, one in line to △ Martin, one in prolongation of do, and one at right angles to E[a]. . . .
>
> Sept. 2nd On reoccupation of this station a stone was placed 1 1/2 f[ee]t below surface, with hole, as usual, to mark the station. See sketch of △ Skiff (Lawson 1861f:18).

Station "Skiff," Coose Bay, Oregon (Figure 4)

> June 20th This station is on the commencement of the highest part, and about 200 metres from the extreme p[oin]t, of the ridge skirting the ocean beach on the Peninsular. It is 38 f[ee]t high, and its position is sufficiently prominent to readily catch the eye. It is nearly in line with the first direction taken by the small channel following the W[est] shore of the Bay, where it begins to widen, opposite Pigeon P[oint].

Some 25 metres to seaward the ridge descends suddenly to a sandy flat, 150 metres wide, extending to H[igh] W[ater] mark. The ridge is very irregular in shape and is sparsely covered with a co[a]rse, harsh grass.

There is not a single natural object in the vicinity to which to refer the station, which is marked on surface by three stubs, with cooper nails, each 6 f[ee]t from center (Lawson 1861f:16).

Station "Dennis," Coose Bay, Oregon

Aug[ust] 26th This station is on the ridge skirting the ocean shore on the Peninsular, and is almost W[est] from △ Martin. Its position will be best understood by a reference to the sketch accompanying this description, which is necessarily meager for the want of any characteristics in the vicinity by which the position may be recognized.

It is marked in the usual manner on the surface by three stubs, with copper nails, each 6 f[ee]t dist[ant] from the center; one is in line to Coose Head △, one in prolongation of do, and one at right angles to seaward (Lawson 1861f:20).

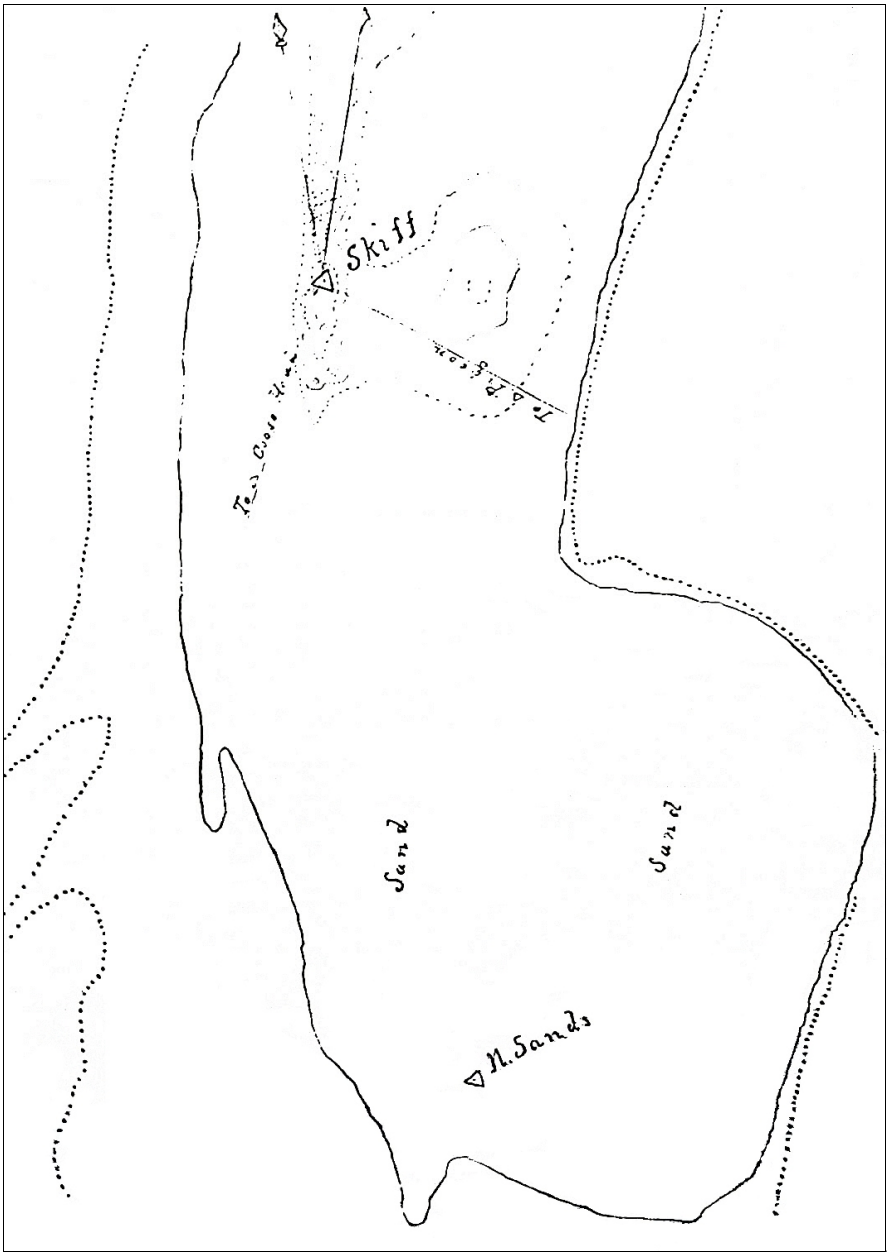

Fig. 4. Plat of Station "Skiff," showing Station "North Sands" (Lawson 1861f:17).

Station "Martin," Coose Bay, Oregon (Figure 5)

This station is on the highest p[oin]t of the first (Southern) of the prominent sand hills on the Peninsular and is about 1/3 of distance from the Bay to ocean shore. A belt of scant pines skirt the Bay shore along the Eastern face of this hill. The line to △ Duke passes between two of the largest trees. A third was felled--the signal showing thru' a double arch formed by the boughs interlacing above and below. The N[orth] face of this hill is very steep; the valley below is densely overgrown with small trees.

In the Bay shore, in line to Marked Tree (Anderson) is an isolated sand hillock covered with small bushes; on its S[outh] face is a single pine tree bearing 199° 15'.

This hill is also shifting one, and hence presents no good marks to which to refer the station. The station is marked on surface by three stubs . . . (Lawson 1861f:13).

Station "Marked Tree A," Coose Bay, Oregon

June 20th This is a tree leaning outwards on the Bay shore at the N.E. extremity of the first clump of trees on the Peninsular.

It is trimmed nearly to the top, and whitewashed from there downwards several feet. Two f[ee]t above ground on its seaward face the tree is blazed, and has a copper nail driven in it. See sketch [not reproduced] of "Coose Head" △ (Lawson 1861f:22).

Station "Kinny," Coose Bay, Oregon

July 20th This station is on the middle one of the three most prominent sand hills on the Peninsular. This hill is considerably nearer the Bay, than the ocean shore, and between the two clumps of wood bordering on the bay, being closer to the Northern one, over the lower part of which is seen [Henry H.] Luse's saw-mill at Empire City.

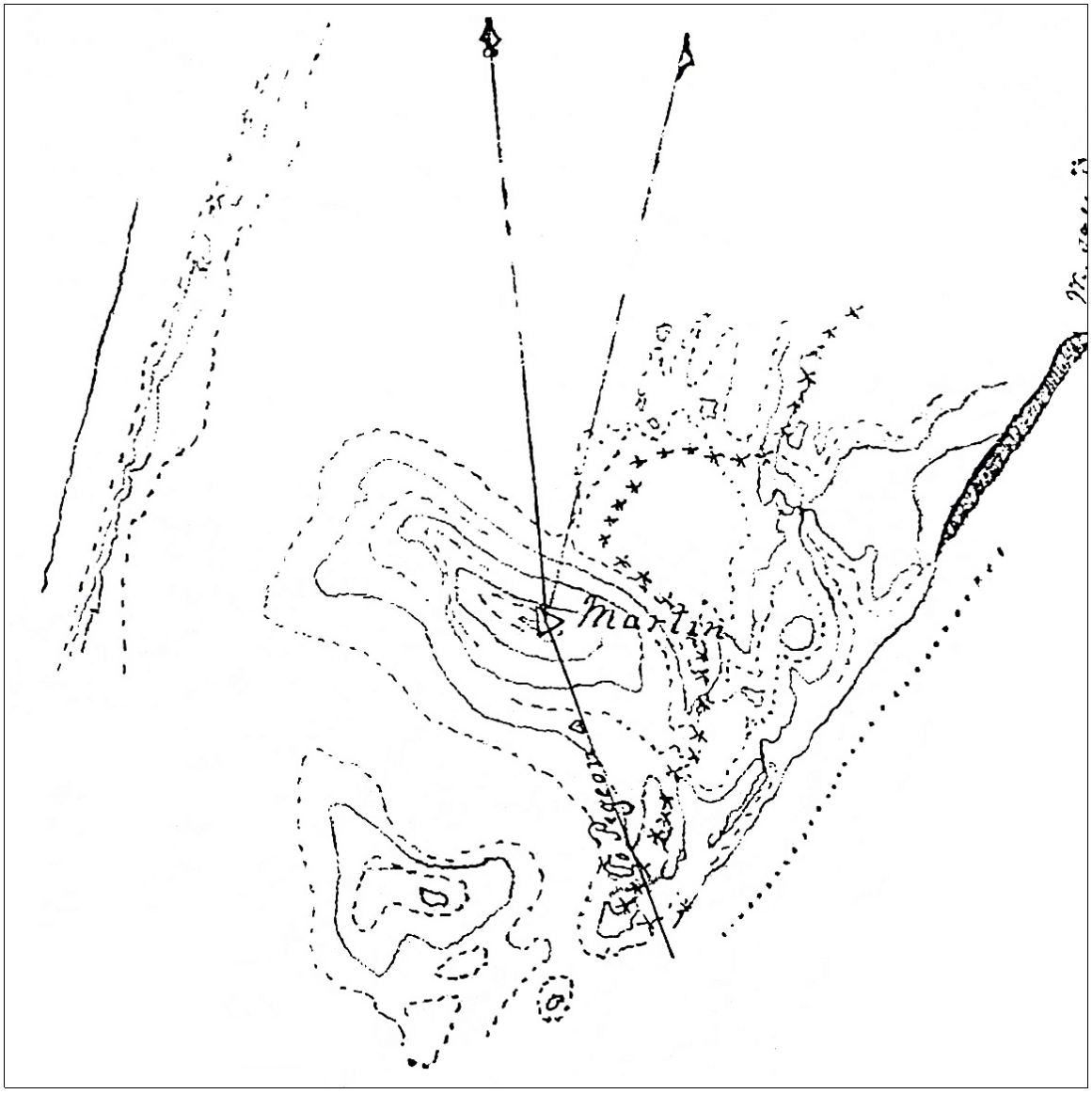

Fig. 5. Station "Martin" on North Spit showing scatter of pines near east shore of spit and Pacific Ocean to left (Lawson 1861f:15).

> Like the other hills the sand is shifting in its nature. The hill extends to the N[orthwar]^{d} behind the 2nd clump of trees. Another irregular ridge trends towards the outside beach. This partially enclosing a low valley in the middle of the peninsular. From the Northern side of the hill a spur projects into the valley. This is covered with grass, and at the extremity has a clump of trees. Farther on in the valley above mentioned is an isolated knoll covered with grass and trees, bearing by A. L. Comp. 357^{o} 15'. On the S.W. part of the hill the trunks of a few dead trees appear above the surface--the sands have so drifted and collected as to almost cover them.

Like the other hills this one is destitute of vegetation and there are no good distinguishing marks to which to refer the station" (Lawson 1861f:11).

Station "Woodland," Coose Bay, Oregon

July 1st This station is on the [blank] of the range of high sand hills on the peninsular dividing the bay from the ocean and is about half a mile from the bay shore. Between the ridge skirting this shore and the foot of the hill is a low flat covered with a scant growth of cedars and bushes. To the W & S.W. are two large detached mounds, with grassy sides and wooded summits, situated in a low place like a basin, which in winter is evidently the bed of a pond formed by the drainage of the ridges surrounding it. The entire summit of this ridge is sand, without a single blade of grass or even a bush, and consequently without any natural marks to which to refer the station. . . .

July 31st On occupying this station the entire top of the hill was found changed by the drifting sands; the hill was higher in some places 15 feet than formerly, and at the station the sands had formed around the pole so as to leave only the tops of the braces visible. An attempt was made to find the stubs but the loose sands falling in, rendered the labor so great that new stubs, 4 f[ee]t long, were driven in, leaving one f[oo]t below the surface . . . (Lawson 1861f:9-10).

Station "Garden," Coose Bay, Oregon

July 20th This station is on the first sand hill north of △ Woodland, and is directly inshore from S. Base △. The hill is not quite so high as Woodland but the top presents a sharper peak. A clump of trees lies between this hill and S[outh] Base △ and another clump to the N.W. To the W[estwar]^{d} & S[outhwar]^{d} are two wooded knolls mentioned in the description of "Woodland" △.

There are no natural characteristics to which to refer the station (Lawson 1861f:23).

Station "Wreck" [probably the *Captain Lincoln*], Coose Bay, Oregon

July 20th This station is on the ocean beach of the Peninsular upon a small sand hill, near which are the remains of an old lodge, and scattered around are portions of the wreck of a vessel [perhaps the spars and materials salvaged by the castaways from the

Captain Lincoln of January, 1852]. The position of this station is between two higher sand hills, covered with grass, and was selected because it was the only spot from which could be seen stations, "Martin," "Kinny," and "Woodland" (Lawson 1861f:25).

Station "Hash," Coose Bay, Oregon

July 20th This station is on the low sand ridge bordering the ocean beach, and is the next station N[orth] of "Wreck." The hills are so much alike that it is impossible to identify the station by any characteristic marks. Stations "Martin," "Kinny," "Woodland," and "Garden" are visible from "Hash," the line to "Woodland" just clearing the N[orther]^{n} end of wooded mound (a) marked on sketch of "Woodland" (Lawson 1861f:27).

Station "Trail," Coose Bay, Oregon

July 20th This station is about a mile N[orth] of "Hash" on the same chain of sand hills and is nearly W[est] of "Henderson." It is near this station where the trail across the Peninsular from [John] Henderson's house, strikes the ocean beach (Lawson 1861f:29).

Station "Henderson," Coose Bay, Oregon

July 19th This station is the highest of the collection of small sand hills forming the N[orther]^{n} boundary of the small prairie on which Henderson's house and claim is located. There is nothing to distinguish this hill from any of the surrounding ones, but its size, all being covered with a scant growth of wild tansy" (Lawson 1861f:30).

The U.S. Coast Survey in 1861 thus established twelve stations on the North Spit from the trail between the beach and Henderson's Marsh south to the sandy promontory at the harbor's entrance. The notes are useful in the assessment in 1861 of conditions on the North Spit. The notes are supplemented by sketch maps of stations "Martin" and "Skiff" and by Lawson's charts of the lower estuary and harbor entrance (Figures 6-10).

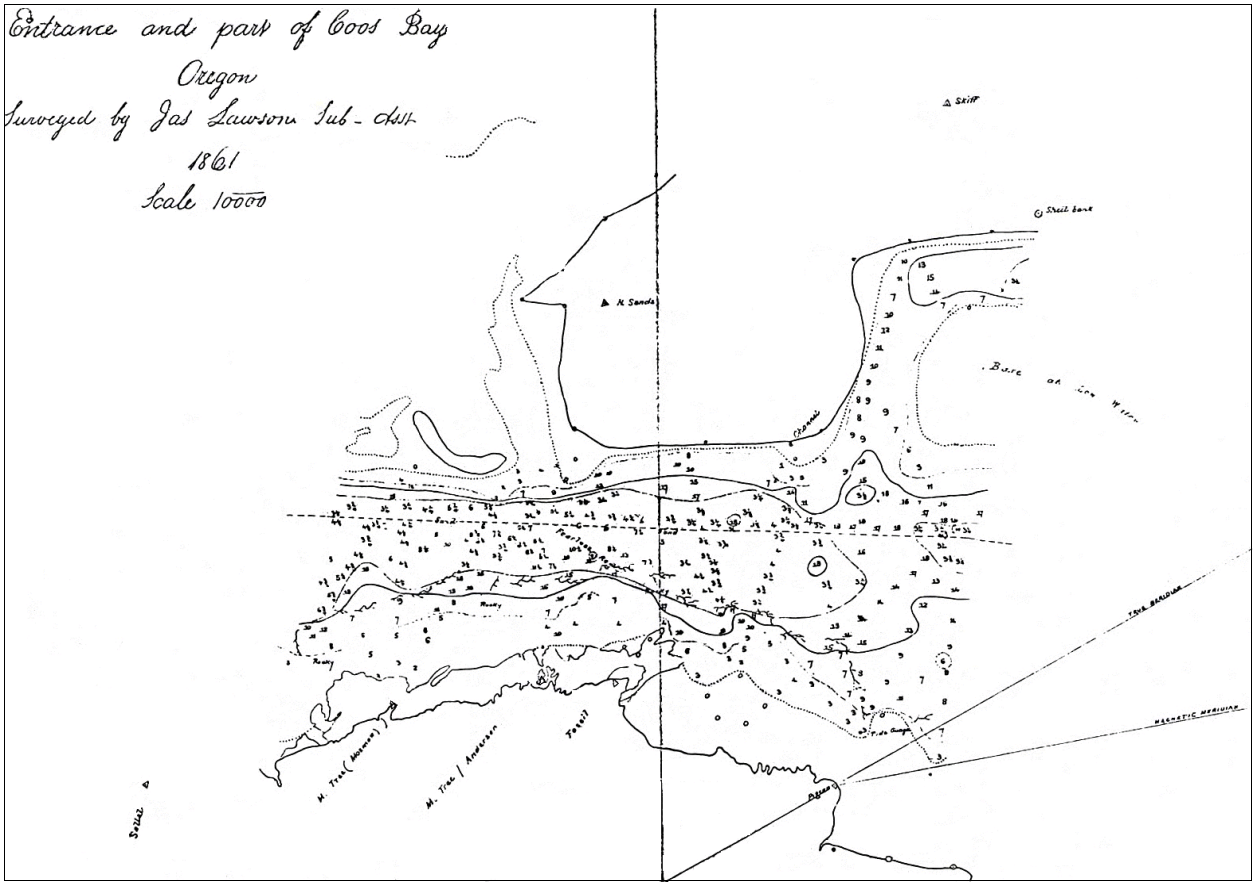

Fig. 6. Chart of lower Coos Bay estuary showing stations "North Sands" and "Skiff" on North Spit, stations "Pigeon," "Fossil," "M. Tree (Anderson)," "M. Tree (Mosman)," and "Sallal" on east side of bay, and "Fearless Rock" in channel (Lawson 1861e).

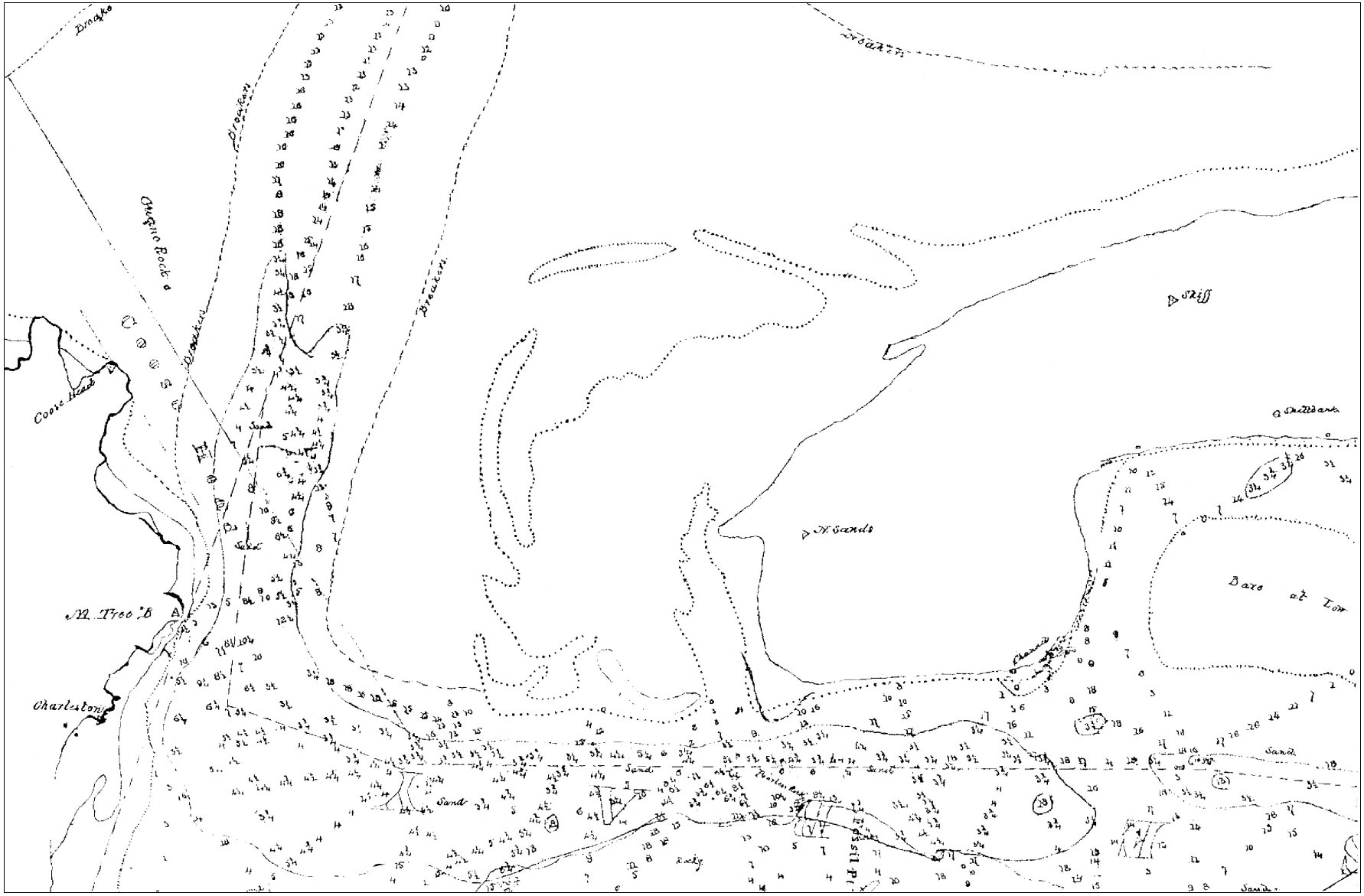

Fig. 7. Chart of lower Coos Bay estuary showing Coos Head (left), east side of estuary (foreground), and North Spit (upper right). Breakers --- and shoals . . . were indicated (Lawson 1861g).

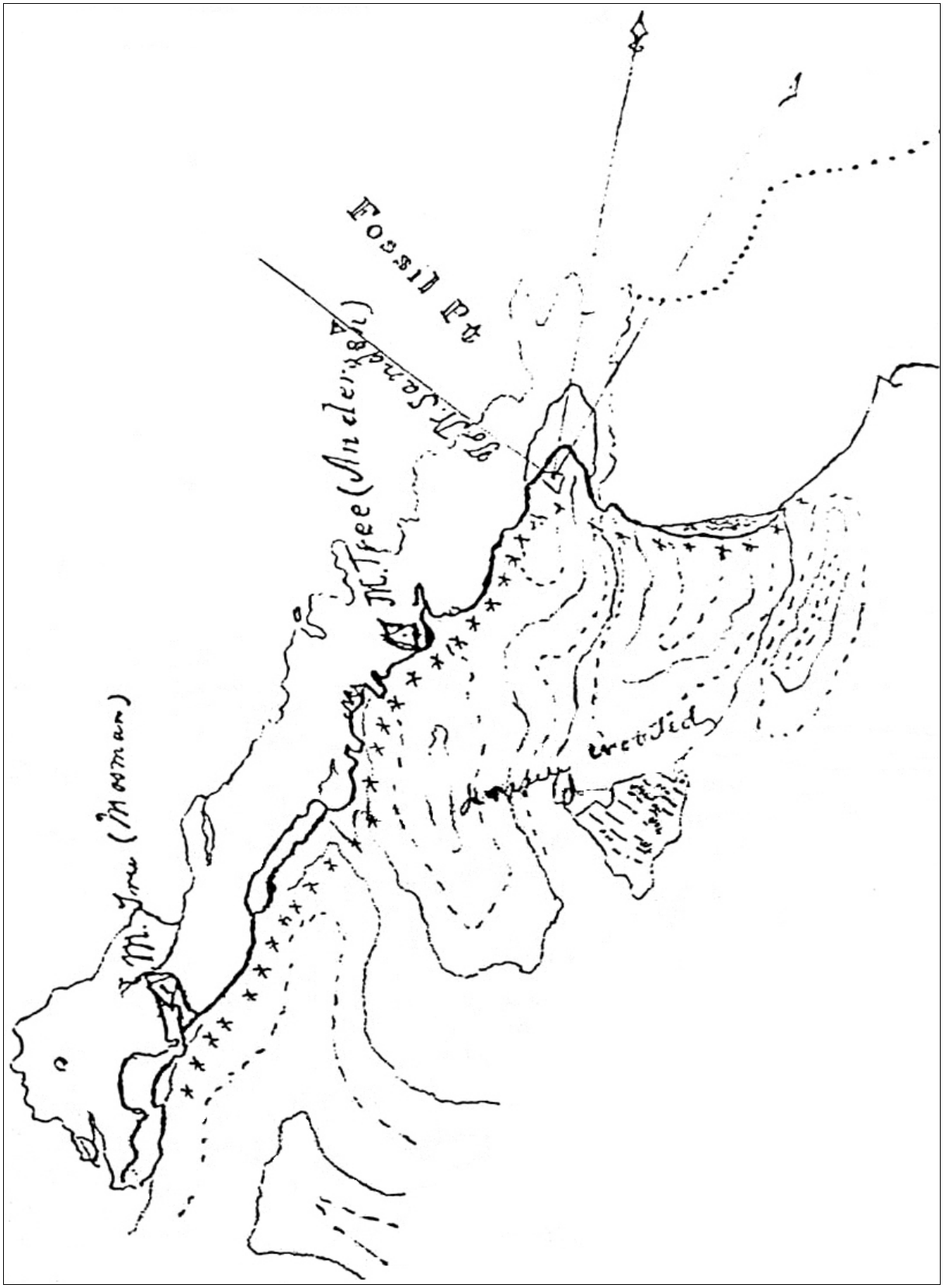

Fig. 8. Stations "Fossil Point," "M. Tree (Anderson)," and "M. Tree (Mosman)" on the east side of the lower Coos Bay estuary with reference to "North Sands" at "Fossil Point" (Lawson 1861f:45).

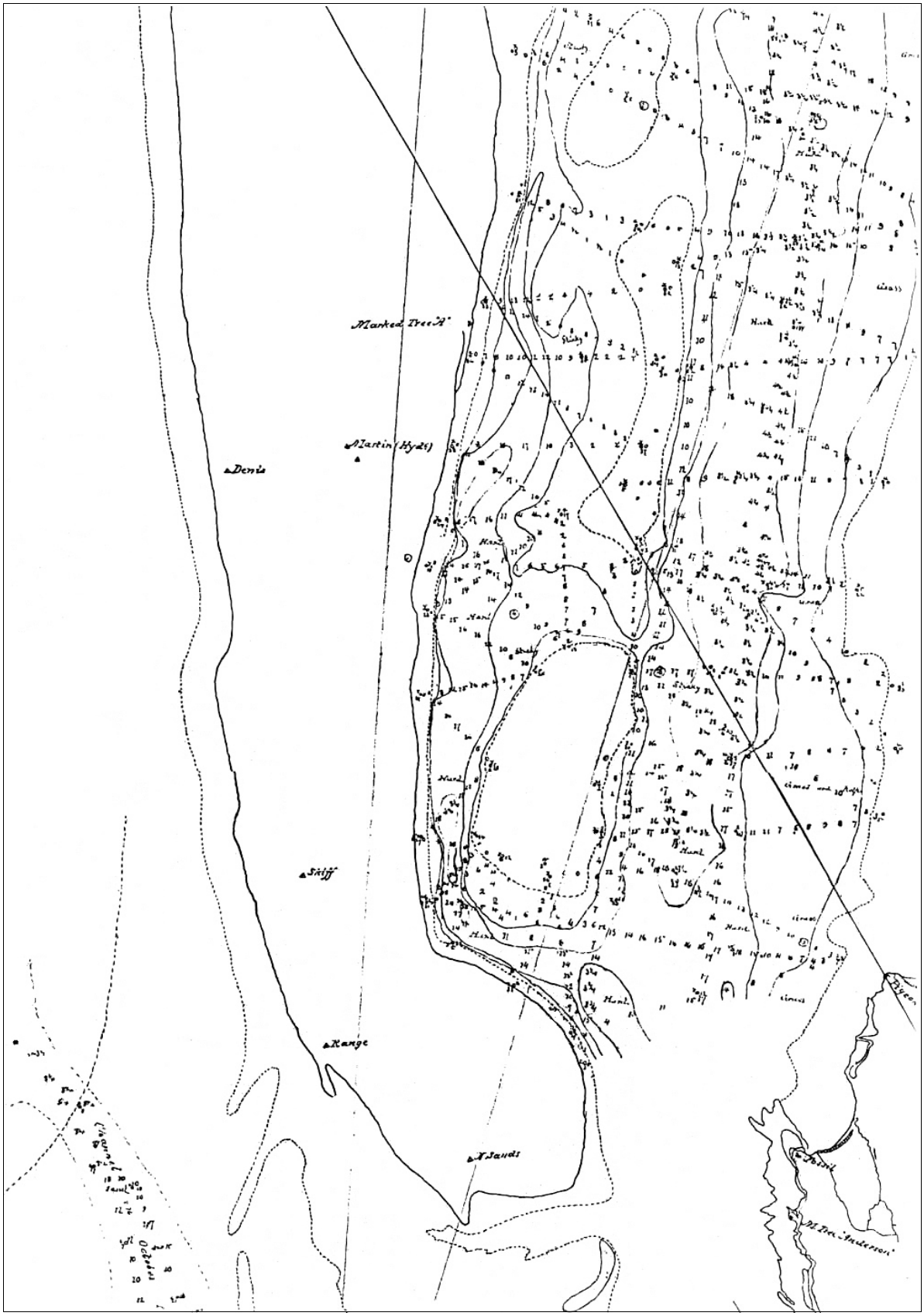

Fig. 9. North Spit "stations" identified on 1865 chart of Coos Bay (Lawson 1865).

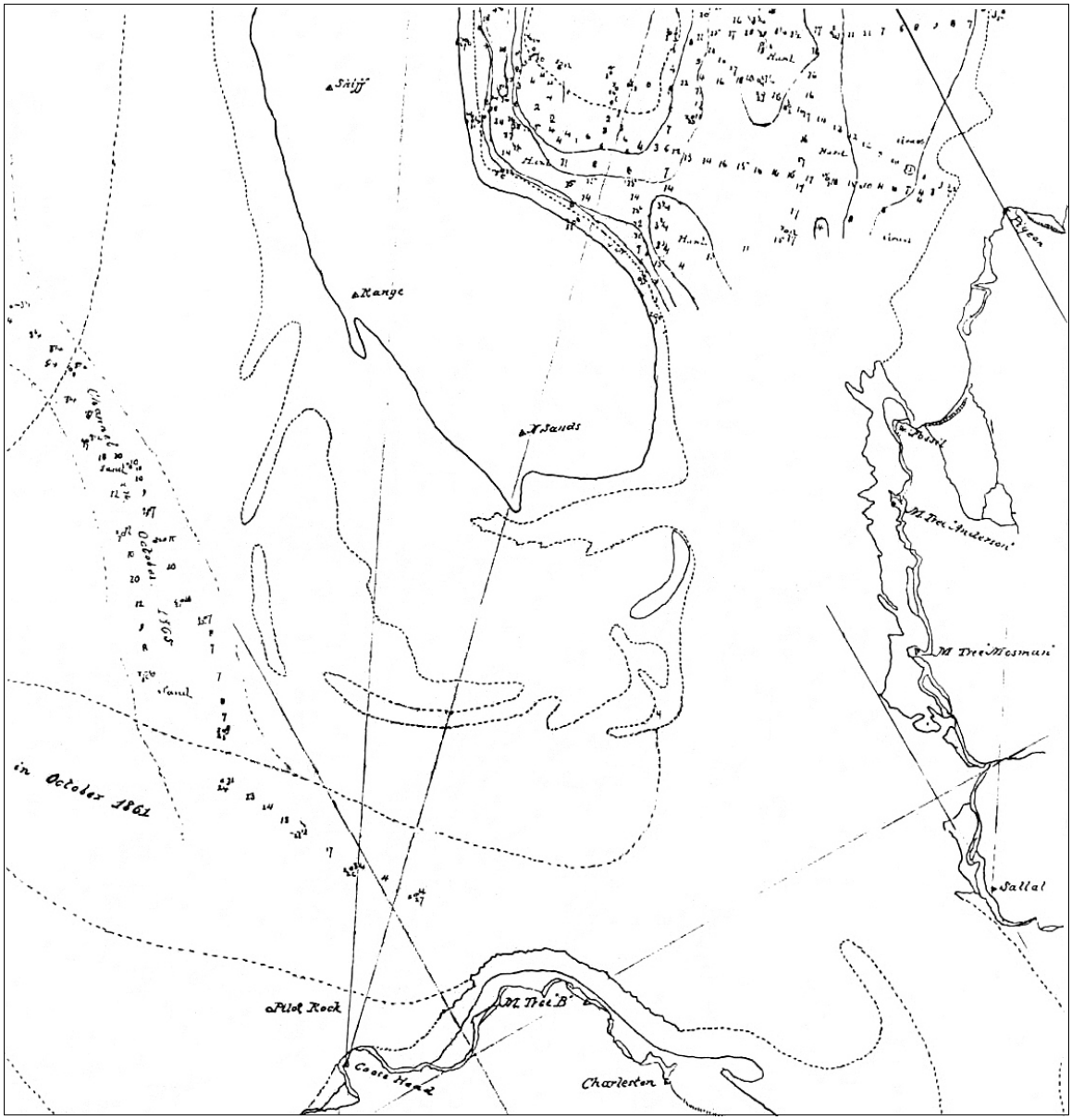

Fig. 10. Shoals south of North Spit and channels of 1861 and 1865 north of Coos Head, determined from surveys on the *Shark*, August 7-October 7, 1865 (Lawson 1865).

1) "North Sands" was the southernmost station on the North Spit.

- The station lay near the margin of high water in June.
- The station was on a broad, treeless, barren sand spit. South of station "Skiff" the spit was devoid even of grass, suggesting it was often wave-washed.

- The spit south of "Skiff" was level, "broken only at intervals by a collection of sand around some old drift log." This information confirms that in stormy conditions the ocean surged across the spit south of "Skiff" and that, at times, "North Sands" was underwater.
- The station was fixed "on one of these [logs], two or three feet above the common level."
- The station was almost due west of "Fossil" on Fossil Point, a landmark on the eastern shore of the estuary.
- South of "North Sands" were extensive shoals, flooded by the Pacific Ocean and intersected with channels. Lawson indicated the shoals with ". . ." marks.

2) Station "Marked Tree A" was the southernmost point on the North Spit where the crew found a tree. They noted it was "at the N.E. extremity of the first clump of trees on the Peninsular." This station lay nearly due west of Station "Alder" on the east shore, a short distance below Empire City.

3) John Henderson in 1861 was the only resident on the North Spit. His house and farm, a place where he grazed cattle in Henderson Marsh, was located at the extreme north end of the spit on the east side near the bay. The coast trail crossed from the beach to the estuary near his property.

Lawson's crews likewise established survey stations along the eastern margin of the lower estuary at points they named Cemetery (at the Pioneer Cemetery near the mouth of Chicksas Creek), Empire, Lodge, Alder, Duke, Luse, Pigeon (at Pigeon or Tarheel Point), Fossil (at Fossil Point), M[arked] Tree (Anderson), M[arked] Tree (Mosman), Salal, and Siwash. The last of these, Siwash, was at the north side of the entrance to South Slough.

At some locations the men found remains of Coos Indian dwellings and burial sites. At Siwash, for example, Lawson noted: "This station is on a low sand ridge, near high water mark, on the Eastern p[oin]t of the entrance to the S[outh] Slough. This entrance is quite narrow but widens out suddenly. Twenty metres

dist[ant] from the station is the skeleton of an Indian Lodge. There is also the frame of a small vessel set up, near the station (Lawson 1861f:52).

The Lawson survey of 1861 also fixed stations from Charleston around Coos Head and south to Cape Gregory. The purpose of the coastal stations was to provide specific reference points on the chart of the harbor entrance so that mariners could sight and line up their vessels to plunge through the breakers, cross the bar, and enter the harbor. Lawson's "Sailing Directions" were explicit in designating the line up from the house at "Gregory Prairie" on what in later years became known as Lighthouse Way with the tree at "Siwash" near the entrance to South Slough (Lawson 1861e, 1862d).

Lawson returned to Coos Bay for additional work in 1863. He reported on June 30 the conditions on the bar as he brought in the *Fauntleroy* five days previously: "On arriving off the bar, finding the opportunity favorable, I piloted the Brig in. This was about one-third flood. I found 16 f[ee]t. I am informed that at high water of spring tides, 22 or 23 f[ee]t can be carried over the bar. The ranges for entering are about the same as former" (Lawson 1863).

In 1865 the U.S. Coast Survey developed "Sheet No. 2, Hydrography of Coose Bay, Oregon." This chart was based on the soundings secured by James S. Lawson aboard the vessel *Shark* between August 7 and October 7, 1865. The survey of 1865 confirmed a dramatic shift in the configuration of the channel into the harbor. In October, 1861, the channel ran in a southeasterly direction virtually parallel to the north side of Coos Head. In October, 1865, the channel had shifted almost ninety degrees to the north and made a sharp turn off Coos Head to turn easterly into the harbor.

In the years 1882-87 the U.S. Coast and Geodetic Survey mounted a detailed examination of the coastline from Yaquina Bay south to Cape Orford. E. F. Pickens and J. Sengteller were employed in developing large maps, each a dozen or more feet long, showing in detail the configuration of the headlands, estuaries, creek entrances into the ocean, stretches of sand dunes, and location of forests. The maps also identified a number of structures, including the names

of settlers, townsites, geographical features, and aids to navigation. The map (Pickens 1887) showed the North Spit of Coos Bay and identified the following features (Figure 11):

- The southernmost tip of the spit lay due west of Pigeon Point.
- Except for a scattering of trees on the east side of the spit, it was mostly unforested.
- A low "sea wall" of mounded sand ran along most of the western margin of the North Spit except the southernmost portion which was unprotected by such buildup.
- The coast trail crossed diagonally from the beach to the "Jarvis Barn" at Fred Jarvis's Landing, the former land claim of John Henderson.

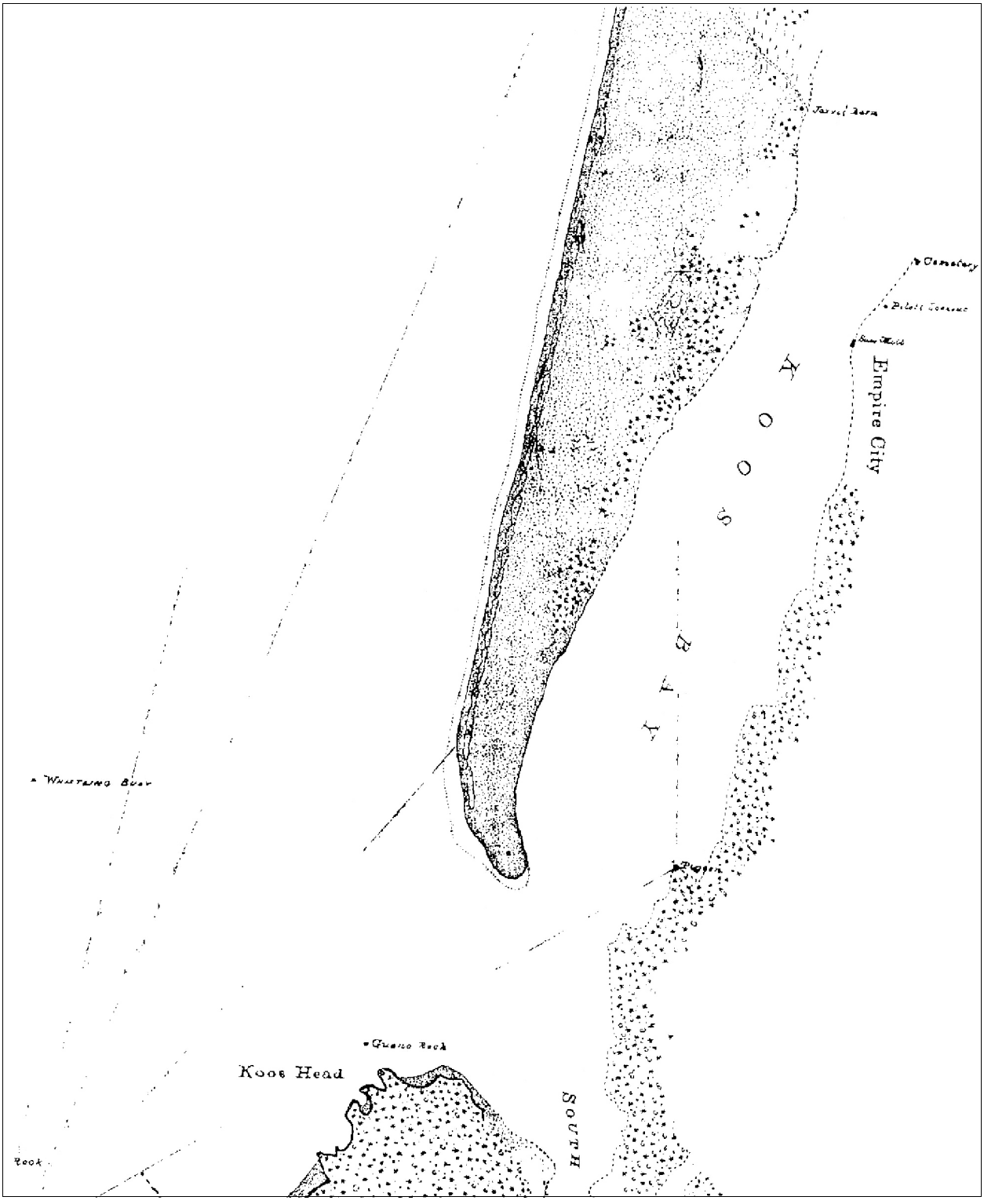

Fig. 11. Map of North Spit, 1887, showing its largely treeless expanse, low seawall build-up on the Pacific shore, and location of its southernmost tip (Pickens 1887).

In 1889 E. F. Dickins and F. Westdahl of the U.S. Coast and Geodetic Survey came to Coos Bay to mount two projects: the topography and hydrography of

the estuary. Their map confirms that the topographic survey was mounted in 1889 and the hydrography in 1890. Dickens arrived at Coos Bay on May 20 and established his headquarters in Empire City. He closed his project on November 23 and sailed with his associates for San Francisco (Dickens 1889a). On December 16 he field his report on seven months of labors at Coos Bay:

> On May 23d commenced laying out my scheme of triangulation signals, recovering & using all old stations possible, but on account of the strong N.W. winds which prevailed at that time, found it would be impossible to make any progress with the Triangulation, so concluded to take up the Topography, cutting in my signals with the Plane Table, this work was carried ahead as fast as the weather would permit, & by July 13th completed our first Plane Table sheet which embraced the lower bay, & on July 11th moved our quarters to Marshfield on the upper bay, & immediately commenced the erection of signals. Finding that the N.W. winds did not blow home with the same force in the upper as in the lower bay, as our scheme was perfected & the signals up, we took up the Triangulation, having two theodolites divided the party & the work, so that both Westdahl & I could observe at the same time, & in this way made rapid progress. By August 22d the Triangulation of the upper bay was finished, computed & plotted & we commenced our second Plane Table sheet which embraced the whole upper part of the bay & a good portion of its tributaries. Owing to the immense amount of detail & very unfavorable weather, progress was slow, & this sheet was not completed until November 2d when we returned to Empire City, & took up the triangulation of the lower bay, including the connection with Cape Arago Light House, this work was finished on November 23d & field work closed for the season.
>
> We had hoped to be also able to complete the Hydrography of Coos Bay, during the past season, but the strong N.W. winds which prevail during the summer, the dense smoke from forest fires which obscures every thing in the fall, & the early beginning of the rainy season, renders it impossible to do ourselves justice in regard to the amount of work accomplished in that section. I can assure you however that no favorable opportunity was lost & that the work was pushed ahead as rapidly as circumstances would permit.
>
> The Coos Bay country is being rapidly settled up & improved, there are now seven steam saw mills on the bay, whose total cutting capacity is about 430,000 feet of lumber per day. These

mills employ a large number of men & keep quite a fleet of vessels busy transporting their lumber to San Francisco and San Pedro, which are their principal markets. There are several coal mines on the bay & its tributaries, but the Newport Mine is the only one being worked at present, & employs three steam colliers to transport its coal to San Francisco. The two principal towns are Empire City, about 500 inhabitants, on the lower bay, & Marshfield, about 1500 inhabitants on the upper bay. There is a well equip[p]ed ship yard at North Bend, which turns out about two vessels a year, ranging from small sized schooners to full rigged ships. There are two salmon cannerys one at Empire City & one at the Coos River mouth.

Dickins reported on the statistics of the 1889 surveys:

Triangulation	
Area of, in square statute miles	36
Number of Signals erected	64
Number of Stations occupied	37
Number of Angles measured	486
Number of Observations	8092
Number of Geographical Positions Determined	62

Topography	
Area surveyed, square statute miles	36
Miles of Shoreline, Coast & Bay	51
Miles of Rivers, Sloughs	67
Miles of Creeks	10
Miles of Wagon Roads	29
Miles of Railroads	5
Miles of Dykes	7
No. of Topographical Sheets finished	2

(Dickins 1889b)

The topographic map and hydrographic chart prepared in 1889-1890 by Dickins and Westdahl (Figure 12) showed several features:

- The southern portion of the North Spit was treeless and lay due west of Pigeon Point.
- Sandbars appeared at low water between the southern tip of the North Spit and Coos Head.
- The "Submerged Jetty" jutted into the estuary from Fossil Point (Dickins and Westdahl 1889-1890).

During the course of the topographic labors, Dickins and Westdahl established stations on the North Spit. Among those they located were the following:

Station Hutchinson (2), Coos Bay, Oregon (Figure 13)

May 1889 This station was located & described by Assistant Lawson in 1862.

> We could find no signs of either center or reference marks, so re-marked station by a glass bottle buried neck down about 2 1/2 feet below surface, above the bottle was placed a cedar stub about 14 inches in diameter, top even with surface of ground, with copper nail to mark center of station.
>
> There are no permanent objects near at hand to which to refer to (Dickins 1889c).

The station drawing prepared by Dickins showed fenced fields at Henderson Marsh, the wagon road across the sand dunes to the beach and north to the Umpqua River, and the house, barn and wharf of Fred Jarvis at Jarvis Landing. It seems likely that Dickins confused the name Henderson, used in 1861 by Lawson, and rendered it Hutchinson.

Fig. 12. Southern tip of North Spit with stations "Quicksand" and "Surf" and identifications of High and Low Water lines 1889 and 1890 and locations of sandbars "at low water" in June and October, 1890 (Dickins and Westdahl 1889-1890).

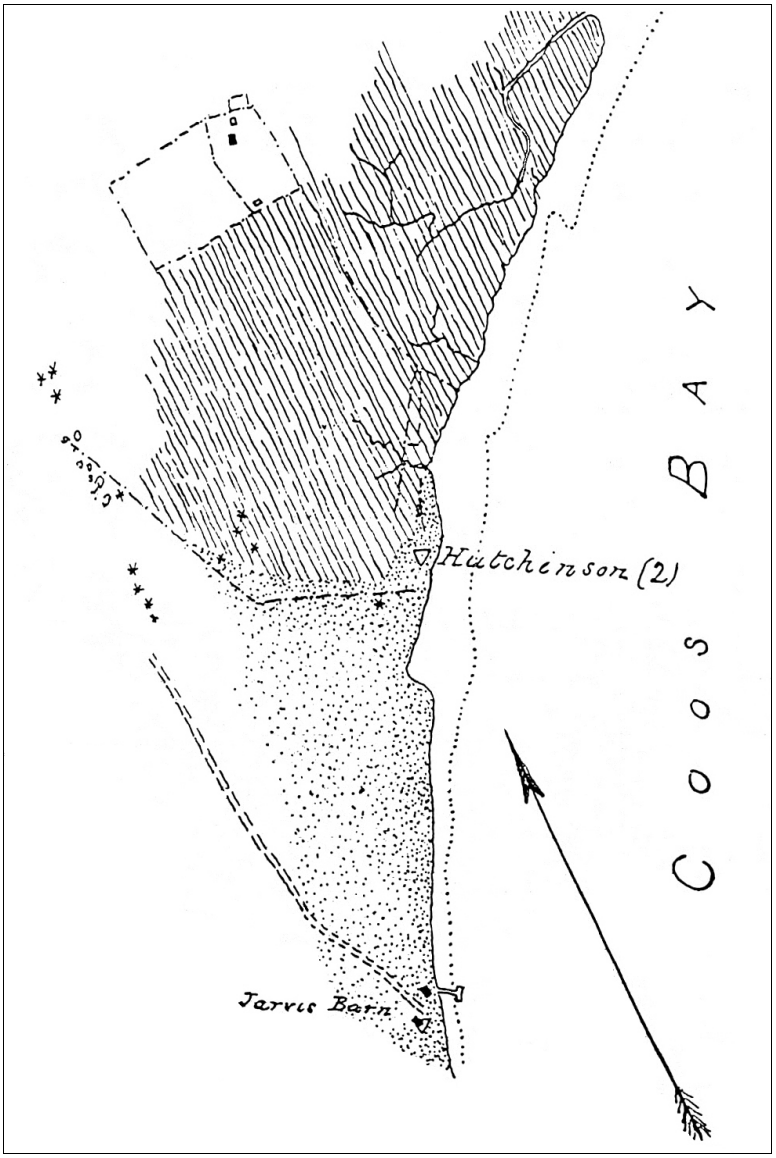

Fig. 13. Station "Hutchinson (2)," Coos Bay, Oregon, 1889, on the east side of the North Spit at Jarvis Landing (Dickins 1889a:31).

Station Pest, Coos Bay, Oregon

June 1889. This station is situated on the North side of the Bay, directly opposite Empire City, & is on the highest sand hill in the vicinity, & is about 400 y[ar]ds back of the Pest House (Figure 14) [quarantine station].

The station was marked in the usual manner, by a stone with hole drilled in it buried about 2 feet below surface. The whole hill is composed of drifting sand & there are no permanent objects to which to refer it.

The signal had to be replaced several times during the season (Dickins 1889a:28).

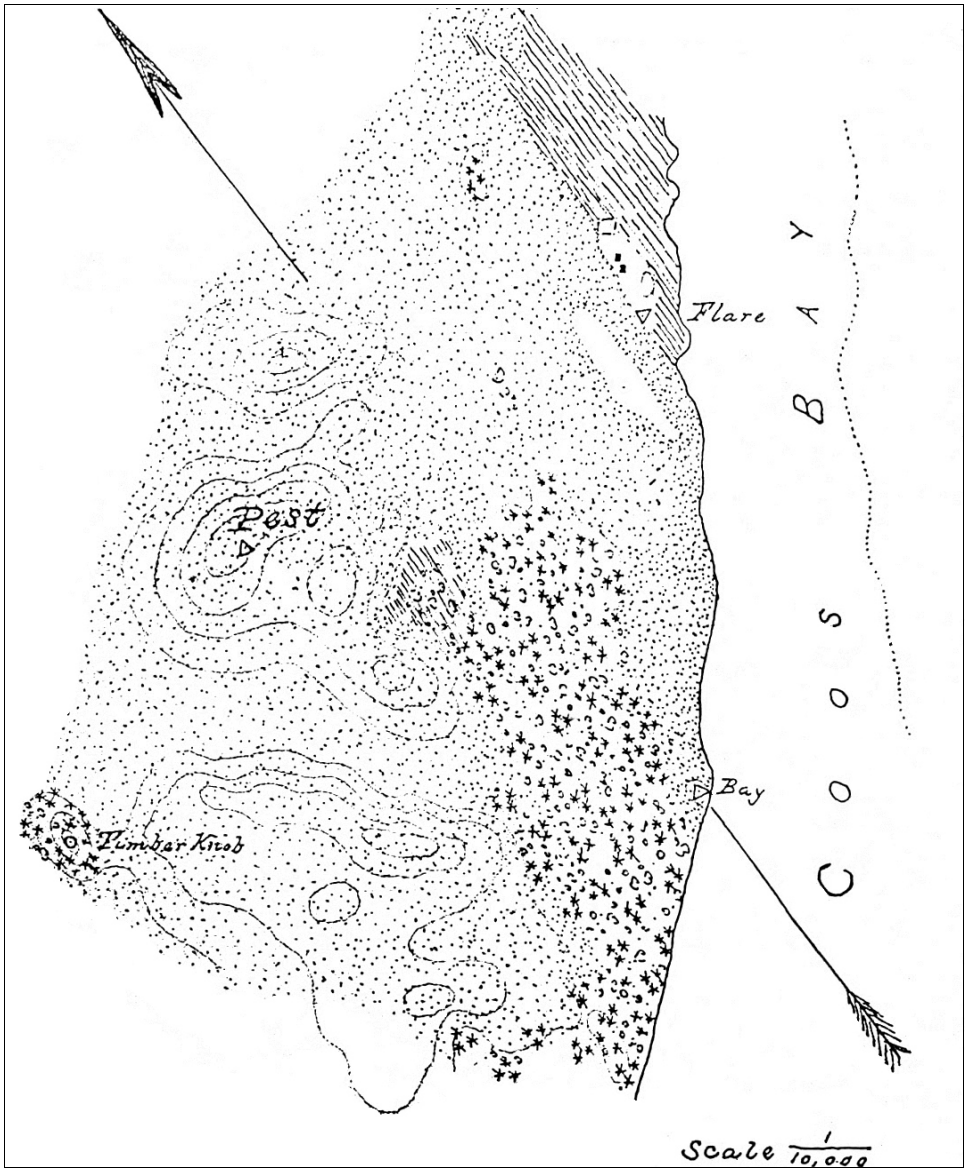

Fig. 14. Station "Pest," 1889, "pest house" (quarantine station) on east side of North Spit opposite Empire City with light scattering of timber amid sand dunes (Dickins 1889a:37).

Station Grove, Coos Bay, Oregon (Figure 15)

June 1889. This station is situated on the summit of the hill or ridge at the Eastern edge of the first grove or clump of timber on the North shore of the [bay], above the entrance.

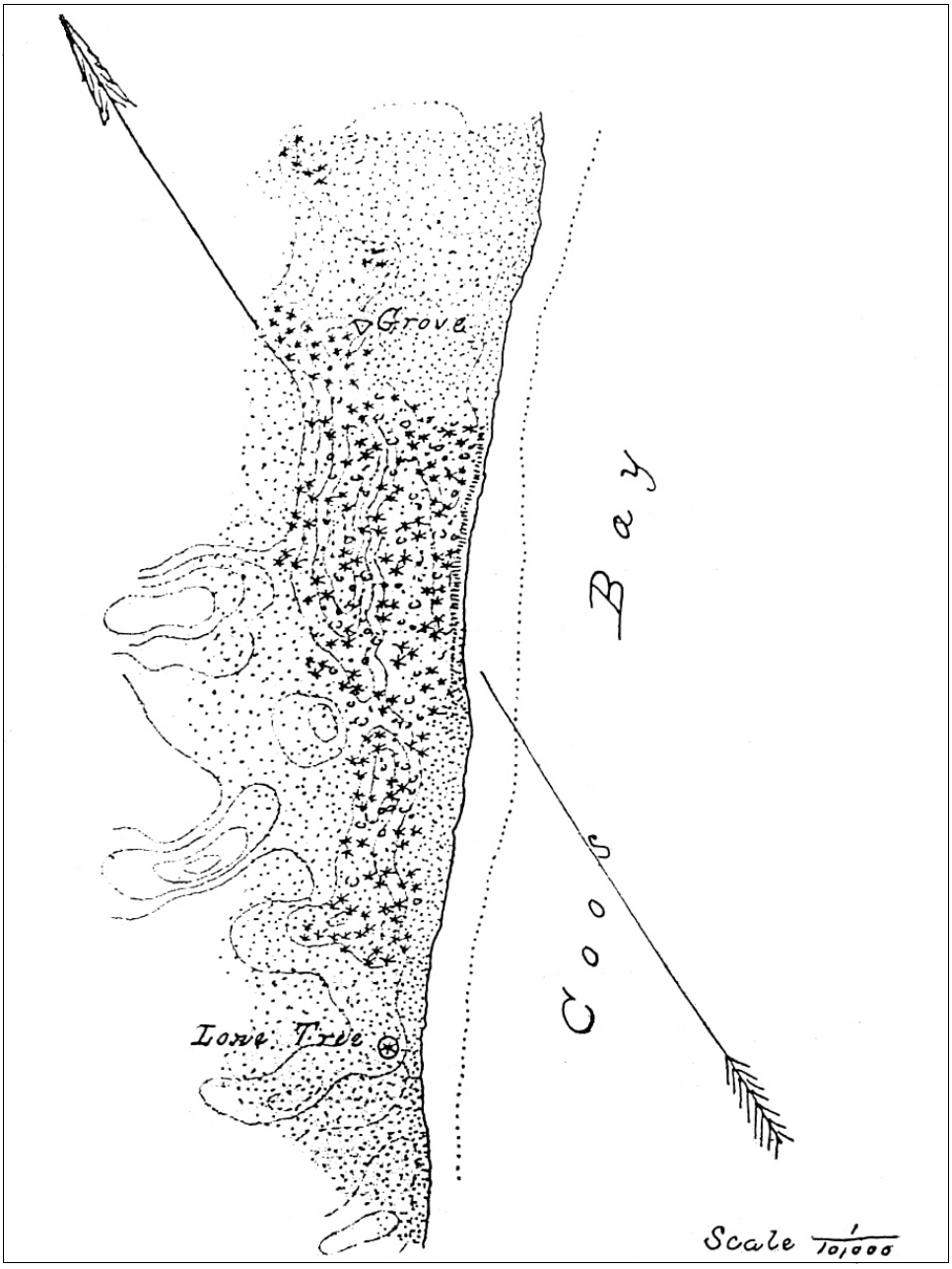

Fig. 15. Station "Grove," 1889, on the east side of the North Spit, a short distance from point "Lone Tree" (See Figure 12) (Dickins 1889a:39).

A fir tree to the S.W. of the station was blazed on side towards signal & marked with copper tack, distant 42.8 feet from center.

Another tree to the N.W. of station was also blazed & marked in same manner, distant 65.2 feet from center.

The station was marked by a stone, with hole drilled in center, buried 2.5 feet below surface of ground (Dickins 1889a:40).

Station North Spit, Coos Bay, Oregon (Figure 16)

June 1889 This station is located on the S.E. extremity of the dry sand spit on the North side of the entrance to the Bay, it is about 10 feet above & about 30 paces from high water mark on the bay side. This whole spit is composed of drifting sand & is continually changing so that it is impossible to make the station marks secure from change.

The station is marked by a cedar stub, about 18 inches in diameter & about 4 feet in length, planted in the sand, top even with surface, with copper tack driven in center of stub to mark station, a bottle was buried neck down below this stub (Dickins 1889a:42).

The work on Station "North Spit" in 1889 and 1890 confirmed the treeless nature of the North Spit and the fluctuations of its high water line between 1889 and October, 1890. The land was clearly not stable, windswept, sometimes wave-swept, and moving with weather conditions and currents of the Pacific Ocean and estuary.

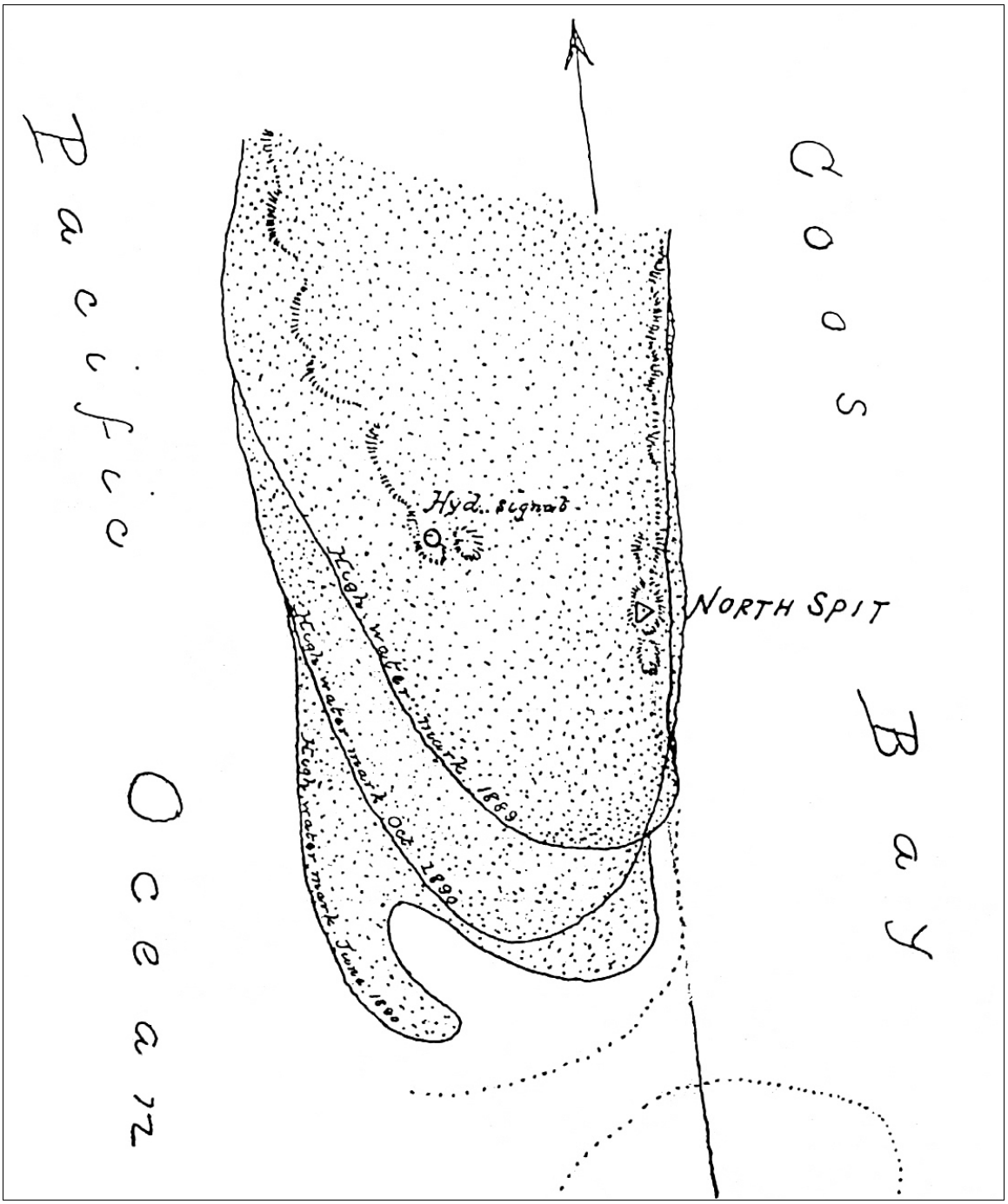

Fig. 16. Station "North Spit," 1889, with "High Water" lines of 1889, June, 1890, and October, 1890 (Dickins 1889a:41).